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ABSTRACT

This is the second part in a series of three parts on the systems analysis approach to academic planning. Part I defined parameters of the systems analysis approach to academic development (ED 083 951). Part II deals with a compendious analysis of degrees offered at 87 colleges and universities with a Black heritage and a summary of occupational outlook for college graduates in the 1970's. The effort here is to correlate the degrees presently offered by these institutions to available jobs, employment records, and projects for future employment. The basis of the degree analysis is the MIS/Tactics (Technical Assistance Consortium To Improve College Services) Fall 1973 reports on degrees offered by 87 Black colleges. Department of Labor statistics are utilized where applicable. (Author)

RESEARCH REVIEW
Volume Two, Number 1

SYSTEMS ANALYSIS APPROACH TO ACADEMIC PLANNING
PART II

By Joel O. Nwagbaraocha

This is the second part in a series of three parts on the systems analysis approach to academic planning. Part I defined parameters of the systems analysis approach to academic development. An attempt was made to draw upon the basic construct of systems analysis in developing several frameworks for solving problems of academic planning and curriculum analysis. Concepts relevant to and the benefits to be gained by using a "systems" model in thinking about academic planning in general and curriculum development in particular were included in the first paper. In addition, an effort was made to show how the "systems" approach provides key tools for a diagnosis of academic structure in a college or university. In doing so, the central notion of each model was stated succinctly, deliberately omitting technical elegance and exactness in the process.

Part II deals with a compendious analysis of degrees offered at 87 colleges universities with a Black heritage and a summary of occupational outlook for college graduates in the 1970's. The effort here is to correlate the degrees presently offered by these institutions to available jobs, employment records, and projections for future employment. The basis of the degree analysis is the MIS/TACTICS Fall 1973 reports on degrees offered by 87 Black colleges. Department of Labor statistics are utilized where applicable.

Systems Analysis and Degree Offerings

Systems analysis approach to academic planning requires continuing examination of courses of study. The approach requires that academic planners have knowledge of new career opportunities and insight into the occupational outlook for college graduates. Then, educators are in a position to structure or restructure the kind of academic programs to be offered in light of new career opportunities and occupational outlook. Such an approach will increase chances of understanding the impacts of these interacting areas. Therefore, it is advisable that each institution undertake a comprehensive review of its curriculum; examine general education and major degree programs, courses of study, and contents of individual courses, and aim to tailor programs to student interests, abilities, needs, and opportunities.

New manpower needs are constantly appearing. It is absolutely essential that our colleges educate students to take advantage of these new opportunities. To prepare students for new career opportunity and to increase the number of Black graduates who can match manpower requirements, a continuous systematic review of the curriculum is needed. Such a review will provide the basis to do the following:

- Validate changes in or deletion of courses
- Initiate new courses, new degree programs, and phase out weakened programs.

One basic thrust (emphasis) in our planning processes should be on preparing students for new and emerging careers. Such an emphasis should be based on undisputed predictions about manpower needs and labor trends. New thrusts support the urgency of motivating students to take advantage of these opportunities.

Knowledge of how students choose careers and the constraints upon their motivation is vital to curricular innovation and academic planning. The communities from which a college draws its students could be centers where interest in new careers are cultivated. The subtle decisions in high school are enormously important in a career decision, e.g., when a student first elects not to take math he rejects all physical science careers. When he first elects not to take biology he is making a decision against life science careers. These decisions are made when a youth is 12-15 years of age--he never gets back on track! A college can assist students and their parents at the precollege levels by familiarizing them with new jobs and careers. A college can also demonstrate its ability in preparing students for these new careers through the kinds of programs offered.

Career Planning for College Graduates

One of the most important decisions a student makes in his lifetime is choosing a career. Final commitment and lasting decisions are generally made during the period of undergraduate studies. Frustrations occur when commitments are

dallied or when the information base for decisionmaking is weak. Planning a career calls for an evaluation of one's abilities and interests, and for knowlege about the requirements of future employment opportunities. General information on overall change patterns in employment opportunities can give curriculum developers, placement officers, counselors, and students a background to understand the outlook, the education and training requirements, and the nature of particular occupations.

To help understand the nation's industrial composition and how it affects employment, the Bureau of Labor Statistics (BLS) views industries as either goods-producing or service-producing (See Figure 1). According to the BLS, most of the nation's workers are in service-producing industries which include activities such as education, health care, trade, repair and maintenance, banking, and insurance. These industries employed 80 percent of all college graduates in the labor force in 1970. The production of goods—farming, building, extracting materials, and manufacturing—has required less than half of the country's work force since the late 1940's. Approximately 20 percent of the nation's college graduates were employed in these industries in 1970. In general, jobs through the 1970's are expected to grow faster in service-producing industries than in the goods-producing industries.

The proportion of jobs open to men and women with college degrees is expected to increase in all major occupational areas (industries employ relatively large number of college graduates) professional and technical, managerial, and sales occupations. Over the 1970-80 period, these factors of growth, replacement, and rising entry requirements indicate a need for over 9.6 million college graudates. (See Figure 2). In summary, a rough balance between supply and demand for college-educated personnel is indicated over the 1970's with the edge perhaps on the supply side. The implication is that college students in the 1970's must be more concerned with career planning than was necessary in the 1960's when college graduates were generally in short supply. Prospective supply-demand imbalances are in the offing in several occupations if college students continue to prepare for work according to past patterns. Among individual fields, for example, a more than adequate supply of elementary and secondary school teachers is expected while the supply of physicians and paraprofessionals in health fields may be below requirements. Yet, extreme caution is essential in interpreting these projections. It is obvious, for example, that new teachers will also be employed, and that health professionals may be excessive in certain geographical regions. The key is to understand the changing conditions of employment.

Degree Programs Offered by Eighty-Seven Black Colleges

A concise analysis of degree programs at 87 Black colleges/universities is made to show kinds of bachelor degree offerings in subject areas. The master, professional, and doctorate degree programs will not be considered here since

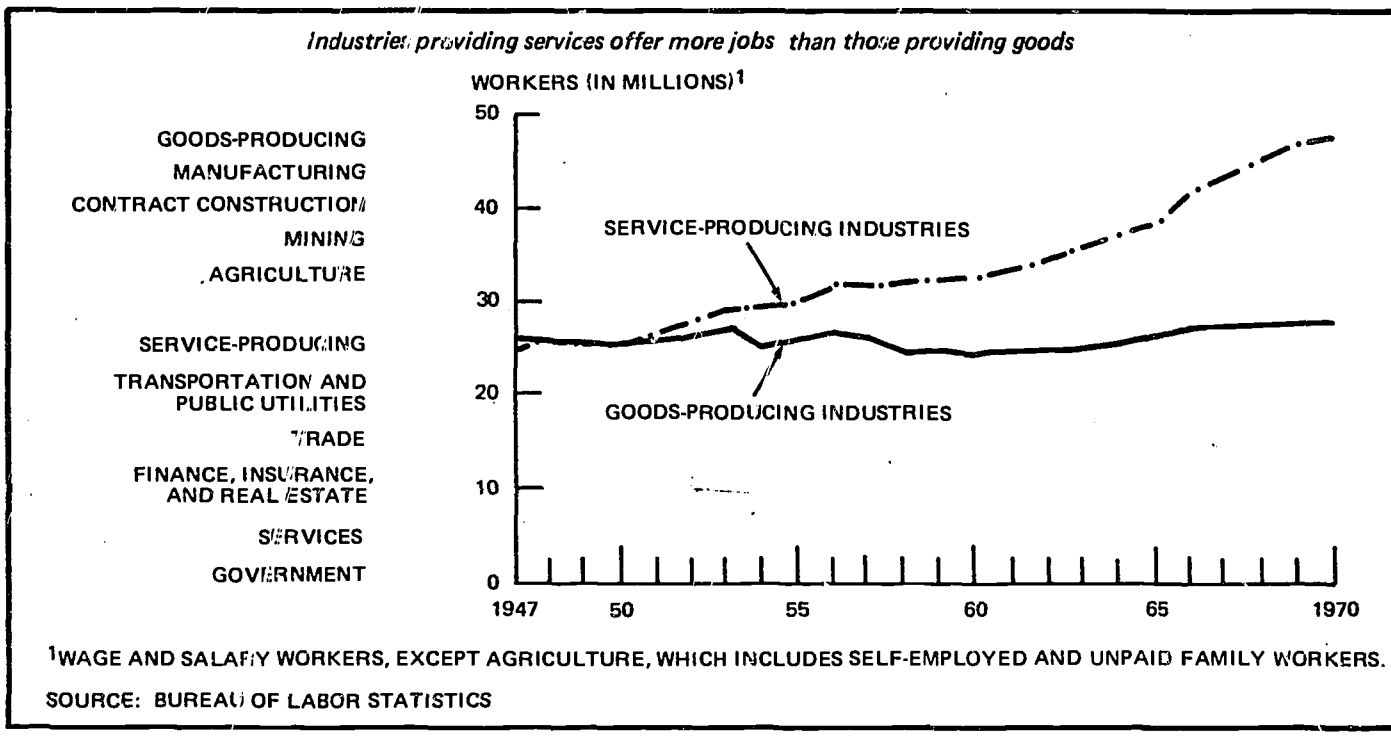

Figure 1. Comparison of Goods-Producing Versus Service-Producing Industries

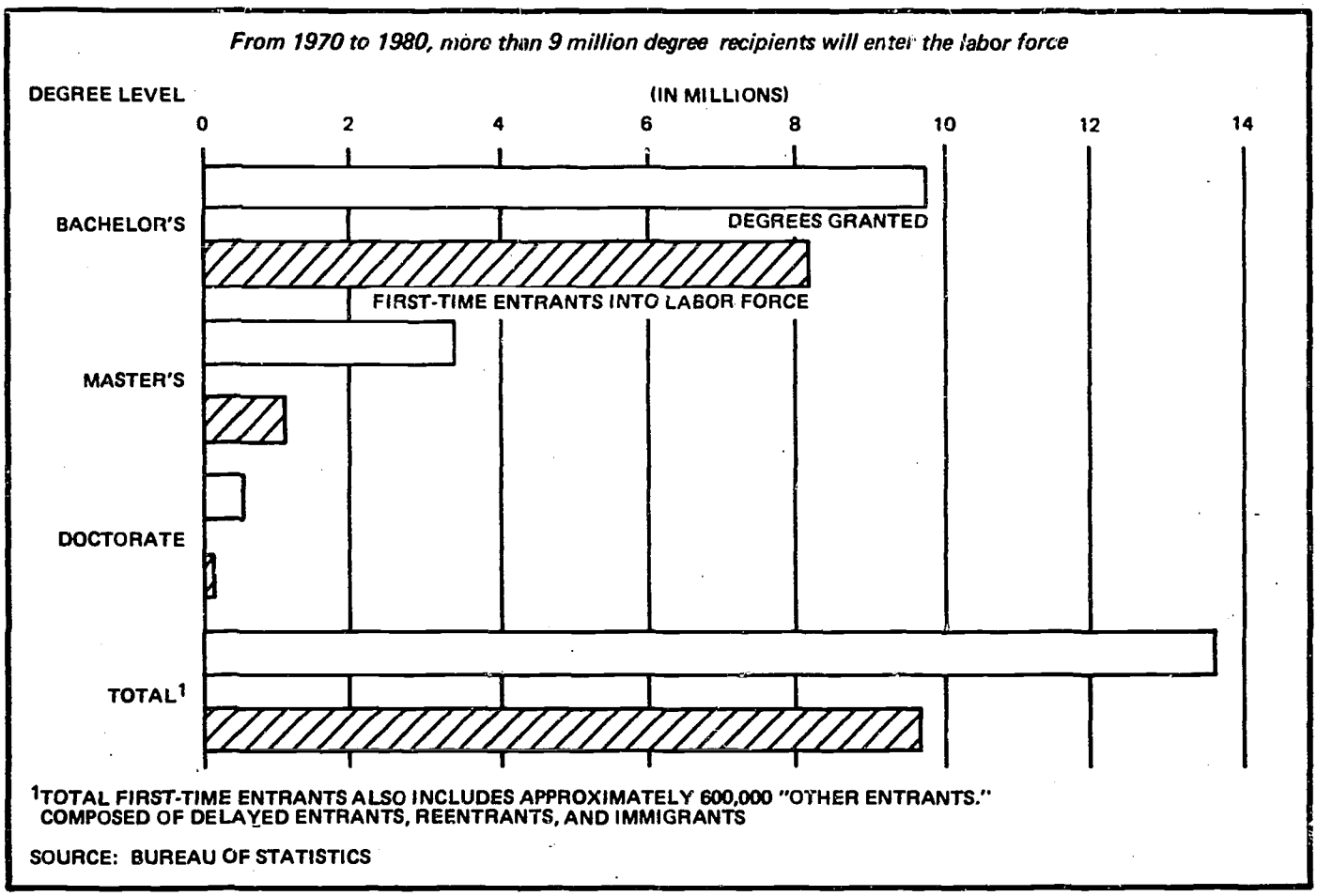

Figure 2. Growth of Labor Force From 1970 to 1980.

this paper deals with academic planning at undergraduate levels, thus the analysis is confined to bachelor degree program offerings. The data is taken from MIS/TACTICS, Fall 1972, Survey for OAPNC, UNCF, and TACTICS Colleges and Universities.[1]

The colleges/universities that completed this survey are listed alphabetically in Table 1.

These 87 institutions enroll 149,266 resident students[2] and 9,512 extension students.[3] Eleven junior colleges, 43 private, and 33 public 4-year predominantly Black colleges completed the MIS/TACTICS survey. The sum total of students enrolled at these schools shows that these students make up 85 percent of students in all Black colleges in the nation.

Table II shows the number and type of degree programs offered at these 87 institutions. Table III shows total student enrollment by departments. Table IV shows the number and type of degree programs offered at 43 private, 4-year colleges. Table V shows the total student enrollment by department at these 37 private, 4-year colleges. Table VI shows the number and type of degree programs offered at 33 public 4-year colleges. Table VII shows total student enrollment by department at 29 public, 4-year colleges.

It is not within the purview of this paper to analyze in detail the data on these six tables. Rather, the effort here is to

[1]MIS—Management Information Systems Directorate of the Institute for Services to Education.
TACTICS—Technical Assistance Consortium to Improve College Services.
OAPNC—Office for Advancement of Public Negro Colleges.
UNCF—United Negro College Fund.

[2] Resident Students—students who take their college work on the main campus or on a branch campus through the regular departments. The location of students' living quarters and legal domicile are irrelevant to this distinction. This also includes students in both day and evening classes.

[3] Extension Students—students taking face-to-face instruction in centers or places away from the main or branch campuses. It may also include on-campus instruction offered by an extension division. The definition is circular in that extension centers differ from branch campuses—students enrolled there are not counted as resident students. The distinction between resident and extension students is no longer maintained by many institutions. Its major remaining use is to distinguish courses and programs requiring varying "mixes" of resource input. It was abandoned in the Higher Education General Information Survey (HEGIS) for Fall 1973.

Table 1. Eighty-Seven Colleges and Universities Participating in MIS/TACTICS Survey

College	College
Alabama A&M College	Malcolm King College
Alabama Lutheran Academy & College	Mary Holmes junior College
Alabama State University	University of Maryland (Eastern Shore)
Albany State College	Miles College
Alcorn A&M College	Mississippi Valley State College
Allen University	Morehouse College
Atlanta University	Morgan State College
Barber-Scotia College	Morris Brown College
Benedict College	Morris College
Bennett College	Norfolk State University
Bethune-Cookman College	N.C. A&T State University
Bishop College	N.C. Central University
Bowie State College	Paine College
Claflin College	Paul Quinn College
Coahoma Junior College	Prairie View A&M College
Coppin State College	Rust College
College of the Virgin Islands	Saint Augustine's College
Delaware State College	Saint Paul's College
Dillard University	Selma University
Edward Waters College	Shaw College at Detroit
Elizabeth City State University	Shaw University
Fayetteville State University	S.C. State College
Federal City College	Southern University, Shreveport
Fisk University	Southern University, Baton Rouge
Florida A&M University	Southern University, New Orleans
Florida Memorial College	Southwestern Christian College
Fort Valley State College	Spelman College
Grambling College	Stillman College
Hampton Institute	T. A. Lawson Jr. College
Howard University	Talladega College
Huston-Tillotson College	Tennessee State University
Interdenom Theological Center	Texas College
Jackson State College	Texas Southern University
Jarvis Christian College	Tougaloo College
Johnson C. Smith University	Tuskegee Institute
Kentucky State College	Utica Jr. College
Kittrell College	Virginia State College
Knoxville College	Virginia Union University
Lane College	Voorhees College
Langston University	West Virginia State College
Lincoln University (MO)	Wilberforce University
Lincoln University (PA)	Wiley College
Livingstone College	Winston-Salem State University
	Xavier University

surface degree program offerings at these institutions. Such data may help academic planners in identifying the academic areas that need to be added or strengthened. A primary concern of any academic planner should be the individual student who has the right to make his own career decisions. It is incumbent upon us as educators/curriculum developers to structure academic programs which will enable the student to make his individual choice with the manpower needs of the nation being borne in mind while we undertake a systematic analysis of our academic programs. These needs can be met best when each individual is encouraged to develop to the limit of his potential. Systematic analysis of academic programs offered at our institutions could bring about the offering of degrees in subject areas that will enable our students to be responsive to the needs of the Black community in particular and the needs of society in general.

A look at the liberal arts departments of these 87 institutions (See Table II) reveals that students in 50 percent of these 87 colleges can major in Education, Mathematics, English, Biology, History, Music, or Sociology. At the other 50 percent of these institutions, students cannot major in

Table II. MIS/TACTICS, OAPNC, NAFEO, and UNCF Fall 1972 Reports

Degrees Offered
87 Colleges Reporting

	Major Areas	Associate		Bachelors	
100	Agriculture Department				
101	Agriculture Business	0	0	7	0
102	Animal Sciences	0	0	9	0
103	Veterinary Medicine	0	0	1	0
104	Plant and Soil Science	0	0	7	0
105	General	2	0	7	0
106	Forestry	0	0	0	0
107	Agronomy	0	0	3	0
200	Arts and Humanities Department				
201	English	3	0	67	0
202	Fine and Applied Arts	2	0	25	0
203	Foreign Languages	1	0	50	0
204	Journalism	1	0	5	0
205	Music	2	0	55	1
206	Philosophy	0	0	20	0
207	Political Science	2	0	45	0
208	Drama	1	0	21	0
209	Communications	0	0	5	0
210	Literature	1	0	6	0
211	Pre-Law	1	0	8	0
212	Radio-TV	0	0	2	0
213	Liberal Arts	9	0	10	0
214	Other	0	0	5	0
300	Biological Sciance Department				
301	Anatomy	0	0	1	0
302	Biology	6	0	69	0
303	Biochemistry	0	0	2	0
304	Botany	0	0	6	0
306	Microbiology	0	0	4	0
307	Zoology	0	0	6	0
308	Other	0	0	2	0
400	Business Department				
401	Accounting	4	0	30	0
402	Commerce	2	0	10	0
403	Economics	2	0	36	0
404	Finance	0	0	4	0
405	Management	2	0	15	0
406	Bookkeeping	0	0	0	0
407	Marketing	0	0	10	0
408	Office Administration	1	0	14	0
409	Administration	1	0	45	0
410	Data Processing	5	0	2	0
411	International	0	0	0	0
412	Secretarial Science	13	0	29	0
413	Other	1	0	3	0
500	Education Department				
501	Art	3	0	27	0
502	Elementary	5	0	67	0
503	Administration	0	0	3	0
504	Secondary	2	0	38	0
505	Language	1	0	16	0
506	Health and Physical Ed.	4	0	58	1
507	Music	2	0	41	0
508	Recreation Education	2	0	13	1
509	Adult	0	2	2	0
510	Home Economics	1	0	23	0
511	Science	3	0	23	0
512	Industrial Arts	1	0	22	0
513	Student Personnel	0	0	0	0
514	Counseling and Guidance	0	0	3	1
515	Early Childhood	1	0	28	2
516	Special	1	0	10	0
517	Vocational	1	0	5	0
518	Correctional	0	0	2	0
519	Business	1	0	29	0
520	Other	1	0	12	1
600	Engineering Department				
601	Architecture	1	0	6	0
602	City Planning	0	0	1	0
603	Civil	0	0	8	0
604	Building Science	0	0	1	0
605	Electrical	1	0	11	0
606	Building Construction	2	0	6	0
607	Mechanical	0	0	11	0
608	Technical Aeronautics	0	0	1	0
609	Industrial Technology	4	0	7	0
610	Chemical	0	0	3	0
611	Other	0	0	4	0
700	Health Fields Department				
701	Dentistry	3	0	1	0
702	Dental Hygiene	1	0	1	1
703	Medicine	3	0	3	0
704	Laboratory Technology	1	0	1	0
705	Mortuary	0	0	0	0
706	Medical Technology	2	0	18	0
707	Nursing	10	0	12	0
708	Speech Pathology	0	0	10	0
709	Occupational Therapy	2	0	1	0
710	Pharmacology	2	0	2	0
711	Other	1	0	2	1
800	Home Economics Department				
801	Child Development	1	0	5	0
802	Clothing and Textiles	1	0	12	0
803	General	0	0	17	0
804	Food and Nutrition	1	0	19	0
805	Urban Extension	0	0	1	0
806	Interior Design	0	0	0	0
807	Other	0	0	1	0
900	Mathematics Department				
901	Computer Science	5	0	6	0
902	Mathematics	4	0	69	0
903	Other	0	0	1	0
1000	Physical Science Department				
1001	Astronomy	0	0	1	0
1002	Chemistry	2	0	64	0
1003	General Science	5	0	13	0
1004	Physics	1	0	37	2
1005	Earth Science	0	0	1	0
1006	Geology	0	0	1	0
1007	Others	0	0	1	0
1100	Social Science Department				
1101	History	3	0	67	1
1102	Jurisprudence	0	0	0	0
1103	Library	0	0	5	0
1104	Anthropology	0	0	6	0
1105	Psychology	1	0	36	0
1106	Behavioral Science	0	0	2	0
1107	Religion and Philosophy	2	0	26	0
1108	Afro-American Studies	1	0	9	1
1109	Police Science	3	0	7	0
1110	Law	1	0	1	0
1111	Sociology	4	0	65	1
1112	Social Welfare	1	0	23	2
1113	Urban Studies	0	0	7	1
1114	Social Science	0	0	18	0
1115	Other	0	0	9	0
1200	Other Department	1	0	1	0

Note: This table reports the number of schools offering a kind of degree for each subject area, i.e., Bachelors-Psychology may be reported as 14 : 2, therefore, fourteen (14) of the total schools reporting offer a bachelors degree in psychology and two (2) are offered for the first time this year.

Economics, Engineering, Health fields, Political Science, Physics, Psychology, etc. Further, less than 10 percent of the colleges reporting offer bachelor degrees in the areas discussed below:

- *Agriculture:* Agriculture Business, Animal Science, Veterinary Medicine, Plant and Soil Science, Forestry, Agronomy.
- *Arts and Humanities:* Journalism, Communications, Literature, Pre-Law, Radio-TV.
- *Biological Science:* Anatomy, Bio-Chemistry, Botany, Microbiology, Zoology.
- *Business:* Finance, Bookkeeping, Data Processing, International Business.
- *Education:* Education Administration, Adult Education, Student Personnel, Counseling and Guidance, Vocational Education, Correctional Education.
- *Engineering:* Architecture, City Planning, Civil Engineering, Building Science, Building Construction, Technical Aeronautics, Industrial Technology, Chemical Engineering.
- *Health Fields:* Dentistry, Dental Hygiene, Medicine, Laboratory Technology, Mortuary, Occupational Therapy, Pharmacology.
- *Home Economic:* Child Development, Urban Extension, Interior Design.
- *Mathematics:* Computer Science.
- *Physical Science:* Astronomy, Earth Science, Geology.
- *Social Science:* Jurisprudence, Library, Anthropology, Behavioral Science, Afro-American Studies, African Studies, Police Science, Law, Urban Studies.

The departmental concentrations of these 87 institutions call for particular attention. Approximately 20 percent of these departmental concentrations are in the natural sciences, 25 percent in the humanities, 30 percent in the social sciences, while the professional or vocational programs account for 50 percent of the total independent majors. In both the liberal arts and professional fields, the degree programs of these 87 Black institutions tend to be concentrated in a limited number of curriculars or majors. These limitations place obstacles in the way of the students who matriculate at these institutions and who want and are prepared to profit from education in other fields. Investigations here may shed some light on the issues of excessive turnover and dropout.

Private and Public Four-Year Black Colleges

Some significant contrasts appear, however, when the private and public institutions are compared (See Tables IV and VI). The majors of private colleges tend to be more heavily concentrated in the liberal arts departments while their public counterparts stress professional specialization.

Focusing only on the range of liberal arts instruction, the figures reveal that the private and public Black institutions offer a considerably wide range of courses in the Humanities

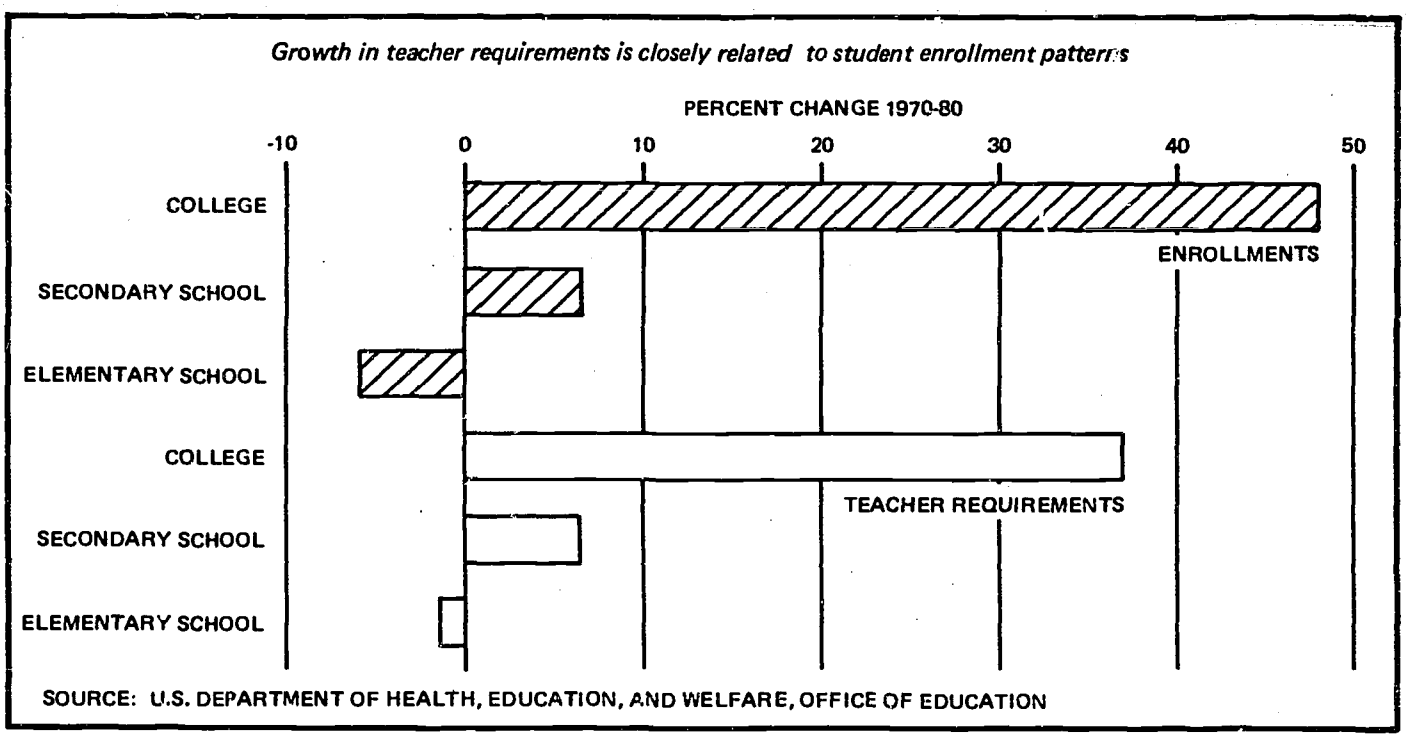

Figure 3. Comparison of Teacher Requirements to Student Enrollment Growth

Table III. MIS/TACTICS, OAPNC, NAFEO, and UNCF Fall 1972 Reports

Total Student Enrollment by Department

75 Colleges Reporting

Department	Freshman	Sophomore	Junior	Senior	Graduate	Professional	Unclass	Total	Percent of Total by Department
Agriculture	496	380	268	245	174	0	21	1,584	1.2
Arts and Humanities	5,737	3,151	2,626	2,618	746	60	501	15,439	11.6
Biological Sciences	1,924	1,408	986	993	364	837	205	6,717	5.0
Business	7,945	5,868	4,164	4,105	729	0	1,062	23,871	17.9
Education	7,192	5,146	5,726	5,039	5,759	0	1,425	30,267	22.7
Engineering	1,349	891	707	513	127	0	251	3,838	2.9
Health Fields	2,748	1,666	1,189	1,106	39	0	173	6,921	5.2
Home Economics	738	610	465	479	183	0	151	2,626	2.0
Mathematics	966	864	762	688	166	0	131	3,574	2.7
Physical Sciences	701	489	485	433	219	0	69	2,396	1.8
Social Sciences	7,907	5,685	5,012	4,769	1,159	1,326	1,018	26,876	20.1
Other Department	5,295	1,331	573	372	362	0	1,553	9,486	7.1
Total	42,995	27,489	22,963	21,360	10,027	2,223	6,538	133,595	100.0

and a much narrower body of instruction in the natural and social sciences. Moreover, a disproportionate share of the courses in the humanities is found in English, accompanied in some institutions with relatively sparse programs in foreign languages and fine arts. This emphasis on the humanities, at the expense of the natural and social sciences, may suggest that most of these colleges have not kept abreast of the rapid expansion of the sciences and may indicate the slow speed at which curriculum had been changing at these institutions.

Epilogue

This brief analysis of degree offerings of these 49 institutions with a Black heritage merely points out the necessity of our colleges to expand their specialized undergraduate majors in the liberal arts and in occupationally related fields. One can surmise that in several of these fields, the demands greatly exceed the supply of qualified personnel. Black men and women graduating in the 1970's with majors in physics, chemistry, engineering, mathematics, or biology could choose from a number of alternative positions in teaching, industry, and the government. Comparable opportunities already exist in some other professional areas, but graduates of Black colleges will not be able to prepare themselves for occupations now accessible to them until our colleges offer appropriate programs.

Care should be exercised however, in adding highly specialized, advanced courses, especially in the liberal arts disciplines which have been shown to be extremely costly and of questionable value in preparing for advanced study in graduate or professional schools. No one institution can or should provide all of the curricula to train students for contemporary opportunities. Proliferation of academic majors is unwise. Institutions in the same state or nearby states may need to share the responsibility of offering appropriate curricula. Only through such cooperation can the colleges offer the broad spectrum of programs required for equal higher education and new careers for Black college graduates. If the curricula of colleges with a Black heritage are to be expanded to prepare for positions in technical fields and in social and natural sciences, and if their professional programs are to be kept abreast of the most advanced developments, the related departments of instruction will have to be enlarged and manned by persons in touch with the latest developments in their fields. Educational programs with greater curricular specialization must be inaugurated if these colleges are to provide equal opportunity for employment in the various branches and levels of the American economy and social structure. In some instances, worn-out courses of study must be phased out.

The mere existence of courses of study does not, however, assure that they will be chosen by students who could profit from them. Hence, through systems analysis institutions could seek information on the actual curricular choices of students. An analysis of student enrollments and plans will shed additional light on students' probable opportunities for

Table IV. MIS/TACTICS, OAPNC, NAFEO, and UNCF Fall 1972 Reports

Degrees Offered

43 Four-Year Private Colleges Reporting

	Major Areas	Associate	Bachelors
100	Agriculture Department		
101	Agriculture Business	0 : 0	1 : 0
102	Animal Sciences	0 : 0	1 : 0
103	Veterinary Medicine	0 : 0	0 : 0
104	Plant and Soil Science	0 : 0	1 : 0
105	General	0 : 0	0 : 0
106	Forestry	0 : 0	0 : 0
107	Agronomy	0 : 0	0 : 0
108	Other	0 : 0	0 : 0
200	Arts and Humanities Department		
201	English	0 : 0	38 : 0
202	Fine and Applied Arts	1 : 0	12 : 0
203	Foreign Languages	0 : 0	23 : 0
204	Journalism	0 : 0	1 : 0
205	Music	0 : 0	32 : 1
206	Philosophy	1 : 0	11 : 0
207	Political Science	1 : 0	24 : 0
208	Drama	0 : 0	8 : 0
209	Communications	0 : 0	3 : 0
210	Literature	0 : 0	3 : 0
211	Pre-Law	0 : 0	4 : 0
212	Radio-TV	0 : 0	1 : 0
213	Liberal Arts	0 : 0	4 : 0
214	Other	0 : 0	2 : 0
300	Biological Science Department		
301	Anatomy	0 : 0	0 : 0
302	Biology	1 : 0	39 : 0
303	Biochemistry	0 : 0	0 : 0
304	Botany	0 : 0	0 : 0
306	Microbiology	0 : 0	0 : 0
307	Zoology	0 : 0	0 : 0
308	Other	0 : 0	1 : 0
400	Business Department		
401	Accounting	0 : 0	11 : 0
402	Commerce	1 : 0	7 : 0
403	Economics	0 : 0	18 : 0
404	Finance	0 : 0	0 : 0
405	Management	0 : 0	7 : 0
406	Bookkeeping	0 : 0	0 : 0
407	Marketing	0 : 0	3 : 0
408	Office Administration	0 : 0	2 : 0
409	Administration	0 : 0	19 : 2
410	Data Processing	0 : 0	0 : 0
411	International	0 : 0	0 : 0
412	Secretarial Science	4 : 0	14 : 1
413	Other	0 : 0	1 : 0
500	Education Department		
501	Art	0 : 0	9 : 0
502	Elementary	0 : 0	36 : 0
503	Administration	0 : 0	1 : 0
504	Secondary	0 : 0	21 : 0
505	Language	0 : 0	11 : 0
506	Health and Physical Ed.	0 : 0	32 : 1
507	Music	0 : 0	20 : 0
508	Recreation Education	0 : 0	4 : 0
509	Adult	0 : 0	0 : 0
510	Home Economics	0 : 0	5 : 0
511	Science	0 : 0	13 : 0
512	Industrial Arts	0 : 0	2 : 0
513	Student Personnel	0 : 0	0 : 0
514	Counseling and Guidance	0 : 0	1 : 0
515	Early Childhood	1 : 0	10 : 1
516	Special	0 : 0	3 : 0
517	Vocational	0 : 0	1 : 0
518	Correctional	0 : 0	0 : 0
519	Business	0 : 0	12 : 0
520	Other	0 : 0	2 : 0
600	Engineering Department		
601	Architecture	0 : 0	2 : 0
602	City Planning	0 : 0	0 : 0
603	Civil	0 : 0	2 : 0
604	Building Science	0 : 0	1 : 0
605	Electrical	0 : 0	3 : 0
606	Building Construction	0 : 0	1 : 0
607	Mechanical	0 : 0	4 : 0
608	Technical Aeronautics	0 : 0	0 : 0
609	Industrial Technology	0 : 0	2 : 0
610	Chemical	0 : 0	2 : 0
611	Other	0 : 0	1 : 0
700	Health Fields Department		
701	Dentistry	0 : 0	1 : 0
702	Dental Hygiene	0 : 0	0 : 0
703	Medicine	0 : 0	3 : 0
704	Laboratory Technology	0 : 0	1 : 0
705	Mortuary	0 : 0	0 : 0
706	Medical Technology	0 : 0	8 : 0
707	Nursing	0 : 0	4 : 0
708	Speech Pathology	0 : 0	3 : 0
709	Occupational Therapy	0 : 0	0 : 0
710	Pharmacology	0 : 0	1 : 0
711	Other	0 : 0	0 : 0
800	Home Economics Department		
801	Child Development	0 : 0	0 : 0
802	Clothing and Textiles	0 : 0	4 : 0
803	General	0 : 0	3 : 0
804	Food and Nutrition	0 : 0	4 : 0
805	Urban Extension	0 : 0	0 : 0
806	Interior Design	0 : 0	0 : 0
807	Other	0 : 0	0 : 0
900	Mathematics Department		
901	Computer Science	0 : 0	3 : 0
902	Mathematics	0 : 0	37 : 0
903	Other	0 : 0	1 : 0
1000	Physical Science Department		
1001	Astronomy	0 : 0	0 : 0
1002	Chemistry	0 : 0	34 : 0
1003	General Science	0 : 0	7 : 0
1004	Physics	0 : 0	18 : 0
1005	Earth Science	0 : 0	1 : 0
1006	Geology	0 : 0	0 : 0
1007	Other	0 : 0	0 : 0
1100	Social Science Department		
1101	History	0 : 0	37 : 1
1102	Jurisprudence	0 : 0	0 : 0
1103	Library	0 : 0	0 : 0
1104	Anthropology	0 : 0	1 : 0
1105	Psychology	0 : 0	19 : 0
1106	Behavorial Science	0 : 0	2 : 0
1107	Religion and Philosophy	0 : 0	21 : 0
1108	Afro-American Studies	0 : 0	6 : 0
1109	Police Science	0 : 0	2 : 0
1110	Law	0 : 0	2 : 0
1111	Sociology	1 : 0	34 : 1
1112	Social Welfare	0 : 0	12 : 0
1113	Urban Studies	0 : 0	3 : 0
1114	Social Science	0 : 0	8 : 0
1115	Other	0 : 0	1 : 0
1200	Other Department	0 : 0	0 : 0

Note: This table reports the number of schools offering a kind of degree for each subject area; (i.e., Bachelors-Psychology may be reported as 14 : 2, therefore, fourteen (14) of the total schools reporting offer a bachelors degree in psychology and two (2) are offered for the first-time this year).

Table V. MIS/TACTICS, OAPNC, NAFEO, and UNCF Fall 1972 Reports

Total Student Enrollment By Department

37 Four-Year Private Colleges Reporting

Department	Freshman	Sophomore	Junior	Senior	Graduate	Professional	Unclass	Total	Percent of Total by Department
Agriculture	140	93	52	12	23	0	0	320	0.9
Arts and Humanities	944	627	624	661	64	0	244	3,164	9.2
Biological Sciences	554	440	368	328	89	0	116	1,895	5.5
Business	1,528	1,312	1,160	1,131	163	0	707	6,001	17.4
Education	1,395	1,380	1,214	1,456	707	0	609	6,761	19.7
Engineering	214	188	177	101	25	0	13	718	2.1
Health Fields	465	267	334	252	0	0	28	1,346	3.9
Home Economics	105	107	83	79	41	0	4	416	1.2
Mathematics	188	256	291	244	52	0	66	1,097	3.2
Physical Sciences	122	100	111	105	50	0	28	508	1.5
Social Sciences	1,989	1,713	1,922	1,772	414	109	719	8,687	25.1
Other Department	1,852	597	128	84	269	0	599	3,529	10.3
Total	9,405	7,080	6,461	6,225	1,897	199	3,125	34,392	100.8

further advanced education or for vocational placement and progress. In addition, an analysis of each institution's enrollments, curricular offerings, majors elected, career choices, and degrees granted must show unmistakably that the institution ought to offer a considerably more diversified range of curricular options. Each institution ought to make overall master plans for curricular development including related facilities and essential supporting faculties. The necessary academic development should, moreover, in spite of their urgency, be made judicially in terms of currently available resources and a realistic appraisal of prospective additional assets. Systematic and continuing institutional planning is urgently needed so that the complete range of such requirements as faculty, physical facilities, libraries, and administrative personnel can be envisaged from the outset and the costs predicted with maximum exactness.

The systematic analysis of our institution's academic programs will underscore the need for more and better education for health services; housing, security, welfare services; regional, metropolitan, and city planning and development; and improved community relations. Academic plans and curriculum development must include increasing specialization with interdisciplinary approaches, in addition to technical, subprofessional, and paraprofessional degree offerings in many fields. This is particularly needed in health fields, education, and welfare specialities, and it is also needed in the behavioral sciences which require the support of systems analysts, mathematical and survey statisticians, clinical psychologists, pyschiatrists, doctors, hospital administrators, social workers, and lawyers to name a few. In addition, all these activities require business services, expansion in housing and transportation demands, architects, engineers, auditors, and a host of related professionals.

Could our academic programs be structured so that nobody be granted a baccalaureate degree who does not have competence in a vocation, a profession, or career? No, of course not, but it could be asserted that no major social system in the 20th century and probably no future society will grant individuals a fair share of the goods and services produced unless in some way they contribute to the production or distribution of those goods and services. In other words, individuals must be able to function in the economic market place—whether it is a capitalistic, socialistic, or some other.

College attendance is largely aimed at preparation for a career. Most students regard vocational preparation as their major purpose. Students, their parents, and the general public do not necessarily reject the intellectual and social benefits of college, rather they tend to subordinate then to economic outcomes. Consequently, college students want to prepare for careers. It is therefore incumbent on our colleges to intervene, in a systematic way, to help our students in career choices. As job opportunities increase, the students in our colleges must know more about what these opportunities are and where to find them.

Table VI. MIS/TACTICS, OAPNC, NAFEO, and UNCF Fall 1972 Reports

Degrees Offered
33 Four-Year Public Colleges Reporting

	Major Areas	Associate	Bachelors
100	Agriculture Department		
101	Agriculture Business	0 : 0	6 : 0
102	Animal Sciences	0 : 0	8 : 0
103	Veterinary Medicine	0 : 0	1 : 0
104	Plant and Soil Science	0 : 0	6 : 0
105	General	1 : 0	7 : 0
106	Forestry	0 : 0	0 : 0
107	Agronomy	0 : 0	3 : 0
108	Other	0 : 0	3 : 0
200	Arts and Humanities Department		
201	English	0 : 0	29 : 0
202	Fine and Applied Arts	0 : 0	12 : 0
203	Foreign Languages	0 : 0	26 : 0
204	Journalism	0 : 0	4 : 0
205	Music	0 : 0	22 : 0
206	Philosophy	0 : 0	9 : 0
207	Political Science	0 : 0	20 : 0
208	Drama	0 : 0	13 : 0
209	Communications	0 : 0	2 : 0
210	Literature	0 : 0	3 : 0
211	Pre-Law	0 : 0	4 : 0
212	Radio-TV	0 : 0	1 : 0
213	Liberal Arts	0 : 0	5 : 0
214	Other	0 : 0	3 : 0
300	Biological Science Department		
301	Anatomy	0 : 0	1 : 0
302	Biology	0 : 0	29 : 0
303	Biochemistry	0 : 0	2 : 0
304	Botany	0 : 0	6 : 0
306	Microbiology	0 : 0	4 : 0
307	Zoology	0 : 0	6 : 0
308	Other	0 : 0	1 : 0
400	Business Department		
401	Accounting	1 : 0	19 : 0
402	Commerce	0 : 0	3 : 0
403	Economics	0 : 0	16 : 0
404	Finance	0 : 0	4 : 0
405	Management	1 : 0	8 : 1
406	Bookkeeping	0 : 0	0 : 0
407	Marketing	0 : 0	7 : 0
408	Office Administration	1 : 0	11 : 0
409	Administration	1 : 0	25 : 1
410	Data Processing	3 : 0	2 : 0
411	International	0 : 0	0 : 0
412	Secretarial Science	3 : 0	15 : 0
413	Other	1 : 0	2 : 0
500	Education Department		
501	Art	0 : 0	19 : 0
502	Elementary	0 : 0	30 : 0
503	Administration	0 : 0	2 : 0
504	Secondary	0 : 0	17 : 0
505	Language	0 : 0	5 : 0
506	Health and Physical Ed.	0 : 0	27 : 0
507	Music	0 : 0	20 : 0
508	Recreation Education	1 : 0	9 : 1
509	Adult	0 : 0	2 : 0
510	Home Economics	0 : 0	17 : 0
511	Science	0 : 0	10 : 0
512	Industrial Arts	0 : 0	19 : 0
513	Student Personnel	0 : 0	0 : 0
514	Counseling and Guidance	0 : 0	2 : 1
515	Early Childhood	0 : 0	18 : 1
516	Special	0 : 0	7 : 0
517	Vocational	0 : 0	4 : 0
518	Correctional	0 : 0	0 : 0
519	Business	0 : 0	16 : 0
520	Other	0 : 0	10 : 1
600	Engineering Department		
601	Architecture	0 : 0	4 : 0
602	City Planning	0 : 0	1 : 0
603	Civil	0 : 0	6 : 0
604	Building Science	0 : 0	0 : 0
605	Electrical	0 : 0	8 : 0
606	Building Construction	1 : 0	5 : 0
607	Mechanical	0 : 0	7 : 0
608	Technical Aeronautics	0 : 0	1 : 0
609	Industrial Technology	2 : 0	5 : 0
610	Chemical	0 : 0	1 : 0
611	Other	0 : 0	3 : 0
700	Health Fields Department		
701	Dentistry	1 : 0	0 : 0
702	Dental Hygiene	1 : 0	1 : 1
703	Medicine	1 : 0	0 : 0
704	Laboratory Technology	0 : 0	0 : 0
705	Mortuary	0 : 0	0 : 0
706	Medical Technology	0 : 0	9 : 1
707	Nursing	6 : 0	8 : 0
708	Speech Pathology	0 : 0	7 : 0
709	Occupational Therapy	0 : 0	1 : 0
710	Pharmacology	0 : 0	1 : 0
711	Other	0 : 0	2 : 1
800	Home Economics Department		
801	Child Development	0 : 0	5 : 0
802	Clothing and Textiles	0 : 0	8 : 0
803	General	0 : 0	14 : 0
804	Food and Nutrition	0 : 0	14 : 0
805	Urban Extension	0 : 0	1 : 0
806	Interior Design	0 : 0	0 : 0
807	Other	0 : 0	1 : 0
900	Mathematics Department		
901	Computer Science	3 : 0	3 : 0
902	Mathematics	0 : 0	31 : 0
903	Other	0 : 0	0 : 0
1000	Physical Science Department		
1001	Astronomy	0 : 0	1 : 0
1002	Chemistry	0 : 0	29 : 0
1003	General Science	0 : 0	6 : 0
1004	Physics	0 : 0	19 : 2
1005	Earth Science	0 : 0	0 : 0
1006	Geology	0 : 0	1 : 0
1007	Other	0 : 0	1 : 0
1100	Social Science Department		
1101	History	0 : 0	29 : 0
1102	Jurisprudence	0 : 0	0 : 0
1103	Library	0 : 0	5 : 0
1104	Anthropology	0 : 0	5 : 0
1105	Psychology	0 : 0	17 : 0
1106	Behavioral Science	0 : 0	0 : 0
1107	Religion and Philosophy	0 : 0	4 : 0
1108	Afro-American Studies	0 : 0	3 : 1
1109	Police Science	3 : 0	5 : 0
1110	Law	0 : 0	1 : 0
1111	Sociology	0 : 0	32 : 0
1112	Social Welfare	0 : 0	11 : 2
1113	Urban Studies	0 : 0	4 : 1
1114	Social Science	0 : 0	10 : 0
1115	Other	0 : 0	8 : 0
1200	Other Department	1 : 0	1 : 0

Note: This table reports the number of schools offering a kind of degree for each subject area; (i.e., Bachelors-Psychology may be reported as 14 : 2, therefore, fourteen (14) of the total schools reporting offer a bachelors degree in psychology and two (2) are offered for the first-time this year).

Foremost is the need to change curriculum to adapt to new occupational openings for graduates of colleges/universities with a Black heritage. However, new academic programs or modified existing programs will not necessarily succeed just because they are based on curricular innovation. Basic knowledge of vocational behavior, motivation, and aspiration of students at our institutions is important to the success of educational programs. Colleges need to be aware of these factors so that students for whom the programs have been designed will reap the benefit.

What has been said is that those responsible for academic planning for the college community must continuously examine courses of study. The adequacy of the contents of academic programs in providing relevant knowledge and appropriate learning experience must be assessed in a regular manner. Knowledge of career opportunities and the availability of good data on occupational outlooks are essential. Accurate information is mandatory about the clients—the students—their abilities, their desires, hopes, and motivations. To accomplish these, a college must have strong institutional research and planning programs staffed with competent people who utilize philosophy supportive of a model for providing pertinent, current, and quick response information. A system analysis approach provides such a model.

The next step in this series of reports is to provide clues on presenting data, in a coherent way, about careers, learning experience, and the learners' abilities so alternatives can be communicated. The third part of this series will speak to these issues.

This section of the article serves as an appendage. It deals primarily with the projections of demand for college educated manpower as delineated in the U.S. Department of Labor, Bureau of Labor Statistics, Bulletin 1730, Occupational Outlook for College Graduates, 1972-73 Edition. What follows is a summary of occupational outlook for college graduates 1970-1980.

I. Business Administration and Related Professions

Accountants. Accounting employment is expected to expand very rapidly during the 1970's because of such factors as the greater use of accounting information in business management, complex and changing tax systems, growth in size and number of business corporations required to provide financial reports to stockholders, and the increasing use of accounting services by small business organizations. Demand for college-trained accountants will be stronger than the demand for people without this academic background. In addition, the trend toward specialization is creating excellent opportunities for persons trained in a specific phase of accounting. Electronic data processing systems are replacing manual preparation of accounting records and financial statement. Consequently, additional highly trained accountants will be required to prepare, administer, and analyse the information made available by these systems.

Table VII. MIS/TACTICS, OAPNC, NAFEO, and UNCF Fall 1972 Reports

Total Student Enrollment By Department

29 Four-Year Public Colleges Reporting

Department	Freshman	Sophomore	Junior	Senior	Graduate	Professional	Unclass	Total	Percent of Total by Department
Agriculture	356	287	216	233	151	0	21	1,264	1.4
Arts and Humanities	4,228	2,336	1,927	1,858	682	60	215	11,306	12.2
Biological Sciences	1,268	897	610	652	275	837	89	4,628	5.0
Business	5,654	4,053	2,963	2,912	566	0	317	16,465	17.8
Education	5,300	3,525	4,471	3,529	5,052	0	796	22,673	24.5
Engineering	945	620	518	399	102	0	141	2,725	2.9
Health Fields	1,824	1,032	820	824	39	0	145	4,684	5.1
Home Economics	610	476	380	394	142	0	115	2,117	2.3
Mathematics	691	558	458	429	114	0	65	2,815	2.5
Physical Sciences	518	349	372	322	169	0	49	1,779	1.9
Social Sciences	5,658	3,668	3,036	2,950	745	1,127	299	17,483	18.9
Other Department	2,894	604	445	288	93	0	945	5,269	6.7
Total	29,946	18,405	16,216	14,790	8,130	2,024	3,197	92,708	100.0

Advertising Workers. Most employers, in the hiring of advertising trainees, prefer college graduates having liberal arts training or a major in advertising, marketing, journalism, or business administration. However, there is no typical educational background for success in advertising. Some successful advertising people have started in such varied occupations as engineers, teachers, chemists, artists, or salesmen. Employment for advertising workers is expected to increase slowly through the 1970's. Opportunities should be favorable, however, for highly qualified applications, especially in advertising agencies, as more and more advertisers turn their work over to agencies. However, many young people attracted to advertising will face stiff competition for entry jobs in this field through the 1980's.

Bank Officers. College graduation is the usual requirement for management trainees who eventually fill the positions of bank officers. A business administration major in finance or a liberal arts curriculum including accounting, economics, commercial law, political science, and statistics serve as excellent preparation for officer trainee positions. The number of banks are expected to increase rapidly through the 1970's as banking activities expand. Although college graduates who meet the standards for executive trainees should find good opportunities for entry positions, many officers positions will be filled by promoting people already experienced in banking operations. Competition for these promotions, particularly in large banks, is likely to be keen.

Hotel Managers and Assistants. Although successful hotel experience is generally the first consideration in selecting managers, employers increasingly emphasize a college education. Many believe the best educational preparation is provided by colleges offering a specialized 4-year curriculum in hotel and restaurant administration. In colleges offering a specialized 4-year curriculum in hotel management, the courses include hotel administration, hotel accounting, economics, food service, management and catering, and hotel maintenance engineering. Students are encouraged to spend their summer vacations working in hotel or restaurant jobs. The cooperative educational program will be ideal for students majoring in hotel management. Through the 1970's, applicants who have college degrees in hotel administration will have an advantage in seeking entry positions and later advancement. The number of hotel managers is expected to increase moderately during the 1970's.

Industrial Traffic Managers. Some employers in this area prefer graduates having a degree in traffic management. Others prefer liberal arts majors who have had courses in transportation, management, economics, statistics, marketing, or commercial law. Many new industrial traffic manager positions will be created in the 1970's as corporations reorganize their shipping and receiving articles into separate traffic departments to centrally control their transportation functions. Other factors expected to contribute to growth in this field are the increasing emphasis in many industries on efficient management of transportation activities, and the trend toward procuring raw materials and finished products from more distant places and distributing them to increasing wider markets.

Marketing Research Workers. A bachelor's degree is the usual requirement to become a marketing research trainee. A master's degree in business administration is becoming increasingly desirable, especially for advancement to higher level positions. College courses considered valuable as preparation for work in marketing research are marketing, statistics, English composition, speech, philosophy, and economics. Graduate training may be necessary for some kind of work—for example, motivational research or sampling and other statistical techniques connected with large-scale surveys. College graduates training in marketing research and statistics are likely to find favorable job opportunities in this occupation through the 1970's. The growing complexity of marketing research techniques will also expand opportunities for psychologists, economists, and other social scientists. Advanced degrees are becoming increasingly necessary for employment in marketing research, and as a result, job opportunities for holders of masters and doctorate degrees will be excellent.

Personnel Workers, Public Relations Workers, and Purchasing Agents. A college education is becoming increasingly important for entrance into these three areas of work. College graduates trained in these three areas are likely to find favorable job opportunities in these occupations through the 1970's.

Conservation Occupations

Foresters. A bachelor's degree with a major in forestry is the minimum educational requirement for students seeking professional careers in forestry. At 52 colleges and universities that offer bachelor degree programs in forestry, 10 areas are covered in their curriculums:

- Dendrology—the characteristics, distribution, and occurrences of trees in forests.
- Forest Ecology—structure and operation of the forest community.
- Silviculture—methods of growing and improving forest crops.
- Forest Protection—primarily against lice, insects, and disease.
- Forest Economics—economic and business principles and problems involved in the management and utilization of forest resources.
- Forest Measurement—measuring and estimating present and potential resources.
- Forest Policy—history and current status of Federal, State and private policies relating to forests and other natural resources.

- Forest Resources Management—study of the interrelations among the various forest resources and basic principles for forest land management.

- Forest Resources Use—principles underlying the use of forest resources for human beneift.

Work study programs that will give a student first-hand experience in forest or conservation is essential. Requirements for foresters are expected to increase moderately through the 1970's. The number of new graduates, however, could more than meet anticipated demand if current trends continue. Therefore, new forestry graduates may face some competition for jobs.

Range Managers. The bachelor's degree with a major in range management or range conservation is the usual requirement for persons seeking employment as range managers in the Federal Government. A bachelor's degree in a closely related field, such as agronomy or forestry, including courses in range management and range conservation is also accepted. Employment opportunities in the Federal Government probably will decrease because of the changing nature of range manager's duties. However, the declining employment opportunities in the Federal Government will be offset somewhat by increasing employment opportunities in the private sector, since range livestock producers and private timber operators probably will hire increasing numbers of range managers. A few openings are expected in developing countries of the Middle East, Africa and South America.

Counseling Occupations

Three generally recognized specialities in the field of counseling occupations are school counseling, rehabilitation counseling, and employment counseling. Most employers in these three areas generally prefer, and many require, a master's degree in vocational counseling or in a related field such as psychology, personnel administration, education, or public administration. Many private agencies prefer to have at least one staff member who has a doctorate in counseling psychology or a related field. Employment of counselors in employment service offices is expected to rise in the 1970's.

Engineers

- Aerospace Engineers
- Agricultural Engineers
- Biomedical Engineers
- Ceramic Engineers
- Chemical Engineers
- Civil Engineers
- Electrical Engineers
- Industrial Engineers
- Mechanical Engineers
- Metallurgical Engineers
- Mining Engineers

The above 11 engineering positions generally require at least a bachelor's degree. Well qualified graduates having training in physics, one of the other natural sciences, or in mathematics may quality for some beginning positions in engineering. Advanced training is emphasized for an increasing number of jobs in these areas. Engineering has been one of the fastest growing professions in recent years and requirements for engineers are expected to increase very rapidly through the 1970's, but at a slower annual rate of growth than during the 1960's. Engineers who are not well grounded in fundamentals and whose specialization is very narrow could be affected adversely by shifts in defense activities and rapidly changing technology.

Health Service Occupations

- Physicans
- Osteopathic Physicians
- Dental Hygienists
- Dentists
- Registered Nurses
- Optometrists
- Pharmacists
- Podiatrists
- Chiropractors
- Occupational Therapists
- Physical Therapists
- Speech Pathologists and Audiologists
- Medical Laboratory Workers
- Medical Record Librarians
- Dietitians
- Hospital Administrators
- Sanitarians
- Veterinarians

Altogether, more than 3.5 million people were employed in health-related occupations in 1970. Less well known, but also of great importance for the public health, is the work of large numbers of workers employed behind the scenes in health service occupations, such as laboratory or X-ray technicians, medical record librarians, and others. The educational and other requirements for work in health fields are as diverse as the health occupations themselves. For example, professional health workers, physicians, dentists, pharmacists, and others must complete a number of preprofessional and professional college courses. A continued rapid expansion of employment in the health field is expected through the 1970's, although the rates of growth will differ considerably among individual health occupations.

Insurance Occupations

- Insurance Agents and Brokers
- Claim Adjustors
- Claim Examiners
- Underwriters

Insurance offers job opportunities for people having different educational backgrounds. Some positions require college training in mathematics, accounting, and engineering. Courses in accounting, economics, finance, business law, as well as courses in insurance subjects are considered helpful. Several thousand openings for insurance agents and brokers are expected to arise each year through the 1970's. Also during this period, the number of insurance agents and brokers is expected to grow moderately.

Mathematics and Related Fields

- Mathematicians
- Statisticians
- Actuaries

The minimum educational requirement for most beginning positions in mathematics is the bachelor's degree with a major im mathematics or with a major in an applied field—such as physics or engineering—and a minor in mathematics. Graduate study is also valuable for advancement to more responsible positions in all types of work. Between 1970 and 1980, the number of new graduates having degrees in mathematics is expected to at least double. Thus, the number of persons seeking professional mathematics employment is expected to rise sharply, and competition for entry positions may intensify.

Natural Sciences Occupations

Environmental Scientists include Geologists, Geophysicists, Meteorologists, and Oceanographers.

The environmental sciences are concerned with the history, composition, and characteristics of the earth's land, water, interior, atmosphere, and its environment. In the typical undergraduate curriculum, students devote about one-half of their time to geology, structural geology, minerology, petrology, inverterbrate paleonotology, geophysics, mathematics, chemistry engineering, meteorlogy, oceanography, and biology. The outlook is for very rapid growth in these areas through the 1970's.

Life Science Occupations. Life scientists may be classified into three broad groups characterized by the general type of organization with which they work: Botanists, who study plants; zoologists, who are concerned with animals; and microbiologists, who work with microorganisms. Some life scientists whose work cuts across other major areas are: agronomists, anatomists, biochemists, biological oceanographers, biophysicists, ecologists, embryologists, entomologists, geneticists, horticulturalists, husbandry specialists, nutritionists, and pathologists. Prospective life scientists should obtain the broadest undergraduate training possible in all branches of biology and in related sciences particularly biochemistry, organic and inorganic chemistry, physics, and mathematics. Courses in statistics, calculus, biometrics, and computer programming analysis are becoming increasingly essential. Training and practice in laboratory techniuqes in the use of laboratory equipment, and in field work are also important. New opportunities resulting from the very rapid growth expected in these fields make the employment outlook for the 1970's good..

Physical Scientists

- Chemists
- Physicists
- Astronomers
- Food Scientists

Undergraduate curriculum leading to the bachelor's degree in any of these fields must include basic natural science courses. The outlook is for a rapid growth of small professions through the 1970's.

Performance Artists and Other Related Occupations

- Actors and Actresses
- Dancers
- Musicians and Music Teachers
- Singers and Singing Teachers
- Commercial Artists

- Industrial Engineers
- Interior Designers and Decorators

In these fields, the number of talented persons seeking employment generally exceeds the number of full-time positions available. As a result, many performers supplement their incomes by teaching, and others work much of the time in different types of occupations. The difficulty of earning a living as a performer is one of the facts students should bear in mind when considering these careers.

Social Sciences

- Anthropologists
- Economists
- Geographers
- Historians
- Political Scientists
- Sociologists

Overlapping among the basic social science fields and the sometimes hazy distinction between these and related fields such as business administration, foreign service work, and high school teaching, make it difficult to determine the exact size of each profession. Economists, however, are the largest social science group, and anthropologists the smallest. Most social scientists are employed by colleges and universities. A large number are employed by the Federal Government and private industry. The trend in some industries is to hire increasing numbers of social science majors as trainees for administrative and executive positions. Research councils and other nonprofit organizations provide an important source of employment for economists, political scientists, and sociologists. Employment in the social sciences has been increasing, and is expected to grow very rapidly through the 1970's. Students who are interested in careers in these areas should aspire to obtain doctorate degrees. College graduates with bachelor's degrees often obtain temporary positions and assistantships in the graduate departments where they are working for advanced degrees.

Teaching

- Kindergarten and Elementary School Teachers
- Secondary School Teachers
- College and University Teachers

The number of teachers needed by the nation's schools depends chiefly on the number of students enrolled. (See Figure 3). At the beginning of the 1970-71 school year, 59.9 million people—almost 30 percent of the country's total population—were enrolled in the nation's schools and colleges. Through the 1970's, continued growth of the school and college population and continued increases in high school and college attendance rates are expected to produce a slight increase in school enrollments and a very rapid rate of increase in college enrollments. Total enrollments in all schools and colleges combined, according to the U.S. Office of Education estimates, may exceed 62 million by 1980.

Technician Occupations

- Engineering and Science Technicians
- Draftsmen

The term "technician" as used here, refers to workers whose jobs require both knowledge and use of scientific and mathematical theory; specialized education or training in some aspect of technology or science; and who, as a rule, work directly with scientists and engineers. The following are areas in which engineering and science technicians are trained and employed: aeronautical technology; air-conditioning, heating, and refrigeration technology; chemical technology; civil engineering technology; electronics technology; industrial production technology; and mechanical techology. Most employers seek workers who have had some form of specialized training for more responsible technician jobs. Employment opportunities for engineering and science technicians are expected to be very good through the 1970's. The demand will be strongest for graduates of post-secondary school technician training programs.

Other Professional and Related Occupations

The Bureau of Labor Statistics details other professional and related occupations in their *1972-73 Edition of Occupational Outlook for College Graduates.* Some of these occupations are: newpaper reporters, technical writers, airline dispatchers, architects, city managers, college career planning and placement counselors, cooperative extension service workers, FBI special agency, flight engineers, home economists, landscaping architects, lawyers, librarians, licensed merchant marine officers, manufacturer's salesmen, systems analysts, pilots and copilots, programmers, psychologists, recreation workers, securities salesmen, social workers, soil scientists, soil conservationists, and urban planners.

The nature of work, places of employment, training, other qualifications and advancement, employment outlook, earnings, and sources of additional information for each of the above occupations are delineated in the handbook. It also contains projections of requirements for all workers and reflects the U.S. Department of Labor, Bureau of Labor Statistics' basic model of the economy in 1980.

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